The Impact of Students' Parental Involvement to their Word Problem – Solving Skills in Mathematics

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ABSTRACT

Word problem-solving develops mathematical power which gives students the tools to apply their mathematical knowledge to solve hypothetical and real-world problems. This study assessed the word-problem skills of grade 9 students through their parental involvement. This study aimed to assess the grade 9 students' word problem - solving skills in Mathematics. Specifically, this study sought answers to the following questions: How are the students characterized in terms of their parental involvement? What is the level of students' word problem-solving skills in Mathematics? Is there a significant difference in the students' word problem – solving skills to their parental involvement? and lastly, Is there a significant linear relationship between students' parental involvement and their word problem-solving skills? Descriptive statistics such as means and standard deviations were used in this study. The study likewise made use of Kruskal – Wallis Test and Pearson's correlation coefficient (also known as Pearson's r). The results reveal that the students' parental involvement needs to be improved form **good** to a **very good** level. Since the word problem-solving skills of the students in terms of devising a plan, carrying out the plan, and looking back belonged to **Did Not Meet Expectations** level, though their understanding the problem belonged to **Outstanding** level, then it should be emphasized to them to improve their performance since their overall word problem-solving skills belong to Fairly Satisfactory level only. For that reason, word problem-solving skills of the students should be improved to Satisfactory level or Very Satisfactory level in case it would be impossible to reach the Outstanding level.

Keywords – parental involvement, word problem- solving skills, descriptive statistics, Kruskal – Wallis test and Pearson's correlation coefficient

INTRODUCTION

Parents could be a father or mother. Parents, defined as primary caregivers, play a critical role in the emotional and academic development of their children. They are also the relatives who plays the role of guardians or someone who looks after a person in the same way that a parent does.

Parental involvement refers to the expressed concrete form of support given by the parents to their children in their studies. However, the ability to identify problems, brainstorm and analyze answers and implement the best solutions is what we called problem – solving skills. It is vital nowadays that the students should develop their problem – solving skills for them to equipped themselves in facing real life problems sooner or later.

Statement of the Problem

This study aimed to assess the grade 9 students' word problem - solving skills in Mathematics. Specifically, this study sought answers to the following questions:

1. How are the students characterized in terms of their parental involvement?

2. What is the level of students' word problem-solving skills in Mathematics?
3. Is there a significant difference in the students' word problem – solving skills to their parental involvement?
4. Is there a significant linear relationship between students' parental involvement and their word problem-solving skills?

Statement of Hypotheses

Problems 1 and 2 are hypothesis-free. On the basis of problems 3 and 4, the null hypotheses of the study were tested at 0.05 level of significance:

Ho_1: There is no significant difference in the students' word problem- solving skills to their parental involvement.

Ho_2: There is no significant linear relationship between students' parental involvement and their word problem-solving skills.

Scope and Limitation of Study

This study was limited to the Grade 9 students of Misamis Oriental General Comprehensive High School, Division of Misamis Oriental. The study is limited to the students' word problem-solving skills categorized as Understanding the Problem, devising a Plan, Carrying Out the Plan and Looking back. The study also looked into students' characteristics, specifically their parental involvement. This study then determined whether the students' characteristics have influence on their word problem-solving skills.

Understanding the Problem. Students were asked to identify "what is asked in the problem?" which limits the big word "understanding the problem".

Devising a Plan. Students were asked to identify the formula required using the given data or what equation was necessary to use after knowing the needed information. In this step, students were left on their own to apply what they have learned.

Carrying Out the Plan. Students were asked to substitute the given information into the formula or equation being used in devising a plan. In a step-by-step manner, students should show their complete solutions in coming up with the correct answers.

Looking Back. Students were asked to write their final answers in a complete sentence with a correct label.

METHODOLOGY

This study made use of descriptive and correlational research designs to determine the word problem-solving skills of grade 9 students in Misamis Oriental General Comprehensive High School, Division of Misamis Oriental. This design best fits this present study because sample size is determined through random sampling, it would utilize frequency counts and percentages and variable is already determined with the assumption that they interrelate with each other and also involving testing of hypotheses, two null hypotheses in the case of this paper.

Scoring Guidelines

The following are the scoring guidelines that were used in the study.

a. For Parental Involvement

Interval	Score	Answer	Description
3.60-4.00	4	At all times	Very Good

2.70-3.59	3	Oftentimes	Good
1.80-2.69	2	Sometimes	Fair
1.00-1.79	1	Never	Poor

b. For Word Problem – solving Skills *(10 items, 5 points each)*

Score	Description
41 – 50	Outstanding
31 – 40	Very Satisfactory
21 – 30	Satisfactory
11 – 20	Fairly Satisfactory
0 – 10	Did Not Meet Expectations

Statistical Treatment

Descriptive statistics such as frequency count, percentages, means and standard deviations were used in this study to answer problems number 1 and 2. The test used for problem number 3 to test the significant difference was Kruskal – Wallis Test, respectively. This Kruskal – Wallis Test had been used in this study in the sense that the assumption for F – test has been violated. Pearson's correlation coefficient (also known as Pearson's r) was used to answer problem number 4.

RESULTS AND DISCUSSION

Problem 1. How are the students characterized in terms of their parental involvement?

Table 1 shows the distribution of the students' parental involvement.

Table 1 Distribution of Students' Parental Involvement (n = 597)

Table 1: Frequency and Descriptive Interpretation of Scores			
Range	**Frequency**	**Percentage (%)**	**Description**
3.60 – 4.00	132	22.10%	Very Good
2.70 – 3.59	286	47.90%	Good
1.80 – 2.69	169	28.30%	Fair
1.00 – 1.79	10	1.70%	Poor
Total	**597**	**100%**	
Mean: 3.01	**Description**: Good	**Standard Deviation**: 0.58	

Table 2: Descriptive Statistics of Indicators

Indicators	**Mean**	**Description**
1. My parents help me in my social and emotional needs.	2.79	Good
2. I can communicate my needs in school to my parents.	3.26	Good

3. My parents allow me in taking ownership of my personal decisions.	2.9	Good
4. My parents provide help in finding solutions of my problems in school.	3.1	Good
5. My parents see to it that my physical and financial needs are provided.	3.44	Good
6. My parents monitor regularly my academic performance.	3.15	Good
7. My parents assist me in my assignments, projects and other requirements.	2.53	Fair
8. My parents attend PTA meetings and other school activities.	3.08	Good
9. My parents find time to consult my teachers regarding my school performance.	2.85	Good
10. My parents monitor my tardiness, attendance, behaviour and academic performance.	3.05	Good

As presented in Table 1, almost half (47.9%) of the students' parental involvement is **good;** 28.3%, **fair;** 22.1%, **very good.** Only about 2% of the students' parents have **poor** involvement. The standard deviation of 0.58 indicates that the students' answers are quite close to the mean.

This means that on the whole, most of the students' have good involvement in their studies. There is still the need to improve or level up the involvement of their parents before one can say that their parents fully support them in their studies in all aspects such as social, emotional, financial, intellectual, moral, physical and spiritual needs.

Parents can be involved in their children's studies by being active members of the Parent - Teachers' Association, being concerned about their children's academic performance, showing commitment and dedication in their children's learning by attending and participating in parents' meetings, in order to gain a better understanding of the performance of their children.

Parents can also be involved by following up their children's subject teachers in order to identify areas where the children are facing challenges. When children do not perform well, their parents go to the extent of contacting their teachers; thus, building and strengthening the teacher and parent relationship.

Parental involvement is a significant element in education and can also be achieved through home-based parental involvement like listening to the child as they read, helping them in completing their homework, as well as in school-based activities, which include attending parents' meeting and education workshops, and even in children's sports activities.

Parent-teacher partnership makes a tremendous impact on children's education. Parents become comfortable when the education system requires their involvement in school activities. The strong collaboration of parents with school authorities can lead to increased improvement in both physical and academic performance of the school. Hence, school administrators have to encourage parents to get involved and make contribution towards helping the school achieve its mission and goals. Seeing parents involved in the education of their children is a good thing because it helps improve the latter's academic performance. Learners become more focused in their school work. This motivates learners not to give up easily when they do not understand a particular topic and will not cut classes because they know that their parents are always monitoring their school attendance. Learners, whose parents are involved, are active and ready to learn. They learn to be punctual, learn to be persistent as the parents would be continuously following up their progress. Taking responsibility becomes a part of the nature of such children as they plan ahead and are able to do their work according to their schedule.

In the study of Topor, et al., (2011) entitled, "Parent Involvement and Student Academic Performance: A Multiple Mediational Analysis", it was revealed that increased parent involvement, defined as the teacher's perception of the positive attitude parents have toward their child's education, teacher, and school, was significantly related to increased academic performance, measured by both a standardized achievement test and teacher ratings of the child's classroom academic performance. Further, parental involvement was significantly related to academic performance above and beyond the impact of the child's intelligence (IQ), a variable not accounted for in previous research.

Lara and Saracostti (2019) mentioned in the result of their study entitled, "Effect of Parental Involvement on Children's Academic Achievement in Chile" that indeed, there were differences in academic achievement scores between the parent involvement profiles: high and medium involved parents had children with higher academic achievement than the lowly involved parents.

In line with these results, Cripps and Zyromski's study (2015) revealed that parental involvement in schools can positively impact achievement in Mathematics and literacy; that parental involvement in middle school can positively impact future high school graduation. Combining the academic consequences with the personal and social influences, shows the importance of perceived parental involvement in adolescent development. Teachers can work to create opportunities within their classroom for parent volunteers such as Brigada Eskwela, where parents and teachers join hands in preparing the classrooms for the students to have a conducive place for learning.

In addition, Gonzales (2010) stated that in a study of 6,400 high school students from diverse socioeconomic and ethnic backgrounds, it has been demonstrated that parenting practices continue to have an impact on students' performance. Specifically, the types of parental involvement examined were helping in the students' homework, attending school programs, watching the students in sports or other extracurricular activities, helping students to select courses and remaining informed of the students' progress in school. When parents are more involved in their children's schooling, the children perform better academically and are more engaged in school. Students exhibited more effort, concentration, and attention across four main subject areas: Math, English, Social Studies and Science. The researcher concluded that parental involvement is even more likely to be beneficial to students' school success when it occurs within an authoritative parenting style.

Problem 2. What is the level of students' word problem-solving skills in Mathematics?

Table 2 shows the distribution of the students' word problem- solving skills in Mathematics.

Table 2. Distribution of the Students' Overall Word Problem- solving Skills in Mathematics (n = 597)

RANGE	FREQUENCY	PERCENTAGE (%)	DESCRIPTION
41 – 50	6	1.00	Outstanding
31 – 40	54	9.00	Very Satisfactory
21 – 30	152	25.50	Satisfactory
11 – 20	107	17.90	Fairly Satisfactory
0 – 10	278	46.60	Did Not Meet Expectations
TOTAL	597	100%	
Mean : 17.50 **Description : Fairly Satisfactory** **Standard Deviation : 9.02**			

INDICATORS	MEAN	DESCRIPTION
Understanding the problem	9.85	Outstanding
Devising a plan	1.65	Did Not Meet Expectations
Carrying out the plan	3.46	Did Not Meet Expectations
Looking back	2.55	Did Not Meet Expectations

Based on Table 2, about 47%, **did not meet expectations;** 18%, **fairly satisfactory,** 25.5%, **satisfactory** level. On the other hand, only about 9% belong to **very satisfactory** level. The last and also the least, only 1% belong to the **outstanding** level. The standard deviation of 9.02 indicates that the students' responses are scattered far from the mean. The students' word problem-solving skills is **fairly satisfactory**.

The students' word problem-solving skills need to be enhanced for them to be able to use it in their daily living. Indeed, there is a need to improve the mathematics word problem-solving skills of the students through constant practice to be able to master them. By doing this, it will help them solve problems faster and allows them to deal with longer and more complicated problems with confidence.

Word problem-solving in Mathematics is an important aspect of learning Mathematics and the mathematical thinking. Everyday work in the classroom shows that students experience more difficulty in solving word problems, than other tasks. They can solve very well different tasks with mathematical operations: addition, subtraction, multiplication, division, identify units of measurement and other tasks that require calculations, tasks with numbers and equations. However, when it comes to word problems, many of them give up. During word problem-solving, students write some numbers, using one or more mathematical operations, but they do not know exactly how to proceed. In other cases, they can compute and use the appropriate operations, but they cannot provide the required answers to the problems. It is not enough for students to learn Mathematics only by solving tasks that require computations or memorizing concepts and operations. Students should be able to solve problems that encourage and develop their thinking and logic. In the future, they will be faced by problem-solving in different situations, in many competitions and tests in which word problems are present. Word problem-solving affects the development and application of students' knowledge and abilities; thus, it must be an integral part of the teaching and learning of Mathematics. Difficulties in word problem-solving can be solved if teachers come up with by different strategies and activities. Students can then be trained in this regard (Kurshumlia and Vula, 2013).

Xin, et al., (2005) emphasize that Mathematics is integral to all areas of daily life: on the job, in school, at home, and in the community. There are evidences that suggest that high levels of mathematical and technical skills are needed for most jobs in the 21st century. Therefore, it is important to ensure that all students, not just those planning to pursue higher education, have sufficient skills to meet the challenges of the 21st century (No Child Left Behind Act, 2002).

This is confirmed in the study of Watanabe-Crockett (2016), wherein he emphasized the importance of developing word problem-solving skills in every student because in the future, complex problems may arise. The more that teachers focus on students' ability to devise effective solutions to real-world problems, the more successful those students will become. By solving complex problems effectively in real time using unique and carefully designed solutions, students are not afraid to get their hands dirty and make mistakes. They also learn from those mistakes, and habitually debrief their processes to create more efficient and economical solutions.

Problem 3. Is there a significant difference in the students' word problem – solving skills to their parental involvement?

To establish if there is a significant difference in the students' word problem – solving skills and their parental involvements, further analysis was done using Kruskal – Wallis Test. Results are shown in table 3.

Table 3 Distribution of Statistics on the Difference in Students' Word problem-solving Skills and Their Parental Involvement

Dependent Variable	Very Good n = 132		Good n = 286		Fair n = 179		Value of Test Stat
	Mean	Desc	Mean	Desc	Mean	Desc	Kruskal-Wallis
Word Problem-Solving Skills	**17.52**	**Fairly Satis-factory**	**18.35**	**Fairly Satis-factory**	**16.12**	**Fairly Satis-factory**	**5.55 ns**
1. Understanding the Problem	9.94	Outstan- ding	9.83	Outstan- ding	9.82	Outstan- ding	1.12 ns
2. Devising a Plan	1.74	Did Not Meet Expecta-tions	1.78	Did Not Meet Expecta-tions	1.37	Did Not Meet Expecta-tions	1.83 ns
3. Carrying out the Plan	3.33	Did Not Meet Expecta-tions	3.99	Did Not Meet Expecta-tions	2.70	Did Not Meet Expecta-tions	7.23 *
4. Looking Back	2.53	Did Not Meet Expecta-tions	2.74	Did Not Meet Expecta-tions	2.24	Did Not Meet Expecta-tions	3.06 ns

Legend:

ns = not significant (alpha > 0.05)
* = significant (0.01 < alpha ≤ 0.05)
** = highly significant (alpha ≤ 0.01)
*** = highly significant (alpha ≤ 0.001)

Table 3 shows that there is no significant difference in students' word problem-solving skills and their parental involvement, $H(2) = 5.55$, $p > .05$. Thus, the null hypothesis is not rejected. This result means that parents' involvement in their children's studies does not significantly influence the latter's word problem-solving skills.

The result also revealed that good parental involvement had 286 students scoring significantly higher than those with very good and fair parental involvement with 132 and 179 students, respectively.

This result disclosed that there is no significant difference in students' word problem-solving skills in terms of understanding the problem, devising a plan and looking back to parental involvements; however, there is a significant difference in students' word problem-solving skills in terms of carrying out the plan to parental involvement.

The table also shows that students were Outstanding in terms of Understanding the Problem, yet Did Not Meet Expectations in terms of Devising a Plan, Carrying Out the Plan and Looking Back. This means that students are clear in identifying the problems in the sense that they are only asked to identify what is asked for in the problem; nonetheless, they do not know what to do next in order to solve such problem. They might have difficulty on what equation or formula they have to use in order to solve the problems. In other words, parental involvement does not have an impact on the students' word problem-solving skills.

In contrary, the study of Keith, et al. (2019), revealed that parental involvement in students' academic lives is indeed a powerful influence on students' achievement. This holds true - for all academic areas, and appears to result in part from the increased homework completed by students with more involved parents. This research suggests that parental involvement is indeed an important influence on achievement, and that psychologists, educators, and policy makers should work to nurture and increase such involvement.

On the other hand, the study of Hara and Burke (2001) also contradicts the result that participating parents reported three very significant outcomes for them as parents: (1) their interest in and appreciation for education, teachers, and learning did, in fact increased; (2) the level of interest their children had in school improved as did

their attitude about school and about their teachers; and (3) parents' respect for the role of teachers and for the impact they have on children changed dramatically. Clearly, those who gained the most through the implementation of the parent involvement program were the students, as demonstrated by their improved academic achievement. Additionally, parents took a renewed interest in learning, both for themselves and for their children.

Parental involvement was likewise found to improve academic and emotional functioning among adolescents. In addition, parental involvement predicted adolescent academic success and mental health both directly and indirectly through behavioral and emotional engagement, according to Wang and Sheikh-Khalil (2014).

Nevertheless, this result contradicts the claim of Durisic and Bunijevac (2017) that parents and families have a major impact on the success of the process of education and upbringing of children. Involvement of parents is related to their position at home (monitoring the learning of children), as well as participation in activities organized at school (parent-teacher conferences, volunteer activities, various forms of parental activism, workshops and seminars for parents). It is well established that parental involvement is correlated with school achievement of both children and adolescents. One way that parents can contribute positively to their children's education is to assist them in their academic work at home. Children, whose parents read to them, assist them with their homework, and provide tutoring using resources provided by teachers tend to do better in school than children whose parents do not assist them. Furthermore, research shows that the level of parental involvement is associated with academic success. Children whose parents are actively involved in their schooling benefit more than children whose parents are passively involved. Specifically, if parents attend teacher conferences, accept phone calls from the school, and read and sign messages from school, their children will benefit academically more than children whose parents do none of the above. Indeed, it is important for parents to monitor their children's academic progress. This includes activities such as checking homework and class work on a regular basis. In addition to checking work at home, their idea of monitoring also involves following them up through report cards and progress reports.

According to Feuerstein (2000) parental involvement is an activity encompassing a wide range of behaviors, ranging from discussing school with children to attending PTA conferences, wherein the PTA is also seen as an agent of change as parents are given the chance of voicing out their ideas and suggestions. By involving themselves in this association, parents will also take part in making positive changes in the school. Thus, the PTA plays an important role in the improvement of the students and the school in the sense that its main role is to build strong working relationships among parents, teachers and schools, in support of students' development.

Problem 4. Is there a significant linear relationship between students' parental involvement and their word problem-solving skills?

To substantiate if there is a significant linear relationship between students' characteristic and their word problem-solving skills, further analysis was done using Pearson Product – Moment Correlation Analysis. Result is shown in table 4 .

Table 4 presents the results of the Pearson Product-Moment Correlation Analysis of students' characteristics and their word problem-solving skills.

Table 4. Pearson Product-Moment Correlation Analysis of Respondents' Characteristics and their Word problem-solving Skills

Respondents' Characteristics	Pearson *r*	P-Value
Parental Involvement	.092 *	.024

Legend:

ns = not significant (alpha > 0.05)
* = significant (0.01 < alpha ≤ 0.05)
** = highly significant (alpha ≤ 0.01)
*** = highly significant (alpha ≤ 0.001)

Table 4 reveals that students' parental involvement (r = .092, p = .024) may have a minimal practical impact on their word problem-solving skills.

The results imply that at some point, when the parents or guardians involve themselves in the studies of their children, it may have a nominal impact to the word problem - solving skills of their children. By simply attending parent - teachers association meetings and other school related activities, they somehow showed their full support to their children's emotional, financial, intellectual, moral, physical and spiritual needs.

Family environment is very important to children's education. The impact of family on child's education can vary depending on the parents' behavior style. One of the most important environmental factors in shaping personality is parental attitude. Also, the attitude of parents is effective in children's psycho-social development. Parental attitude seems to have a great influence on all the mentioned development of the child (Rasim Tösten, 2017).

CONCLUSIONS

Based on the findings of the study, the following conclusions are presented. The results reveal that the students' parental involvement needs to be improved form **good** to a **very good** level.

Since the word problem-solving skills of the students in terms of devising a plan, carrying out the plan, and looking back belonged to Did Not Meet Expectations level, though their understanding the problem belonged to Outstanding level, then it should be emphasized to them to improve their performance since their overall word problem-solving skills belong to Fairly Satisfactory level only. For that reason, word problem-solving skills of the students should be improved to Satisfactory level or Very Satisfactory level in case it would be impossible to reach the Outstanding level.

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